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T1 difficulty modulates the attentional blink only when T1 is unmasked: Implications of attentional capture in the attentional blink!

Simon Nielsen, Tobias Andersen

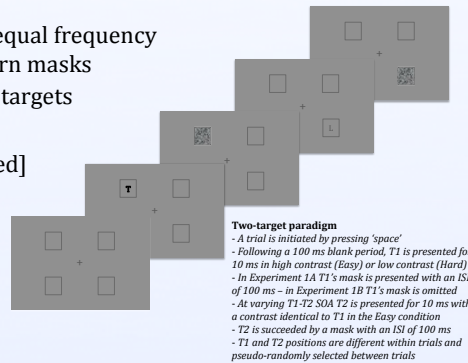
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Introduction

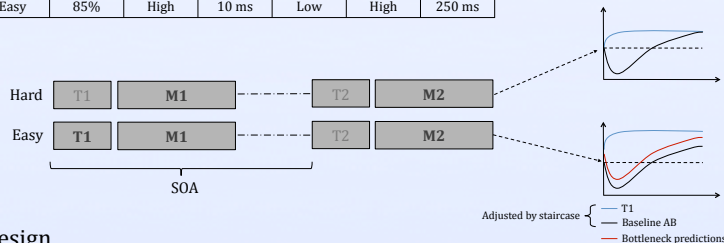
- We use the two-target paradigm and examine bottleneck predictions of how T1 difficulty affects the attentional blink
- Bottleneck theories suggest that making T1 easier to perceive should clear second stage processing faster resulting in a reduced attentional blink
- Previously we found no effect from varying T1 contrast or T1 duration, but proposed that the effect may have been confounded by involuntary attention directed to the mask
- In a new study we vary T1 contrast and examine the effect on the attentional blink when T1 is masked compared to when T1 is unmasked

Method

- Stimuli
 - 20 letter targets presented at equal frequency
 - Randomly generated dot pattern masks
 - Masks presented 100 ms after targets
- Main variables
 - T1 masking [Masked, Unmasked]
 - SOA [100, 200, 300, 400, 600]
 - T1 difficulty [Hard, Easy]
- Instructions
 - Report identity of T1 and T2
 - Guess if uncertain



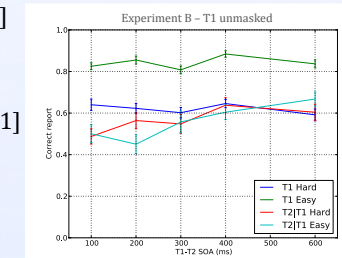
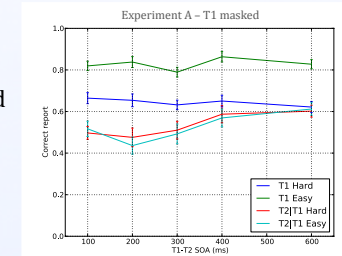
Condition	T1 accuracy	T1 contrast	T1/T2 duration	T2 contrast	Mask contrast	Mask duration
Hard	60%	Low	10 ms	Low	High	250 ms
Easy	85%	High	10 ms	Low	High	250 ms



- Design
 - T1 masking varied between Experiment 1A and 1B
 - Factorial ordered SOA and T1 difficulty within experiments
 - 48 trials in each of the 10 factorial combinations
 - 18 observers conducted Experiment 1A and 1B in counterbalanced order

Findings

- Proportions of correct report are plotted as function of SOA
- Proportions were arcsine transformed and analyzed with repeated measures ANOVAs
- T2 main effect of SOA in Experiment A and B indicates an attentional blink
- Experiment A - T1 masked:
 - % Main effect (T1 difficulty) $[F(1,17) = 0.73, p = 0.41]$
 - % Interaction effect (SOA x T1 difficulty) $[F(4,68) = 1.24, p = 0.30]$
- Experiment B - T1 unmasked:
 - % Main effect (T1 difficulty) $[F(1,17) = 0.60, p = 0.45]$
 - ✓ Interaction effect (SOA x T1 difficulty) $[F(4,68) = 8.03, p < 0.001]$
 - ✓ Main effect (T1 difficulty, SOA = 200 ms) $[F(1,17) = 25.90, p < 0.001]$



Preliminary conclusion*

- Varying T1 difficulty by target contrast modulates the attentional blink only when T1 is unmasked
- Contrary to bottleneck predictions we observed that making T1 easier to perceive increases the magnitude of the attentional blink
- We suggest that this finding indicates capture of involuntary attention which increases with contrast
- Similarly we suggest that involuntary attention directed towards T1's mask confounded the effect of T1 difficulty in Experiment A
- * Inference is based on a single significant data point. In follow up experiments we examine if the effect observed in Experiment B is modulated by properties of T1